

CLAIMS

1. A method for separating at least one narcotic alkaloid comprising:
loading stationary phase media into a chromatographic column;
feeding a crude narcotic alkaloid solution into the chromatographic column;
applying at least one mobile phase to the chromatographic column; and
recovering at least one narcotic alkaloid eluate from the chromatographic column.
2. The method according to Claim 1, wherein when the stationary phase media is loaded into the chromatographic column, the stationary phase media is suspended in a solution.
3. The method according to Claim 2, wherein the solution is selected from the group consisting of acetonitrile, water, methanol, ethanol and iso-propanol.
4. The method according to Claim 1, wherein the stationary phase media is selected from the group consisting of silica, titanium oxide, zirconium oxide and polymer particles.
5. The method according to Claim 1, wherein the stationary phase media includes components selected from the group consisting of phenyl groups, cyano groups and carbon chains of two (2) to thirty (30) carbon atoms.
6. The method according to Claim 4, wherein the stationary phase media includes components selected from the group consisting of phenyl groups, cyano groups and carbon chains of two (2) to thirty (30) carbon atoms.
7. The method according to Claim 1, wherein the stationary phase media includes at least 0.255 kilograms (8.99 ounces) of stationary phase media.

8. The method according to Claim 1, wherein the stationary phase media includes at least one particle with a size that is in a range from about 1 micrometer (39.4 microinches) to about 200 micrometers (7,874 microinches).

9. The method according to Claim 1, wherein the stationary phase media includes at least one particle with a size that is in a range from about 20 micrometers (787.4 microinches) to about 50 micrometers (1,968.5 microinches).

10. The method according to Claim 1, wherein the stationary phase media includes at least one particle with at least one pore, wherein the at least one pore has a size that is in a range from about 30 Angstroms (.12 microinches) to about 1,000 Angstroms (3.94 microinches).

11. The method according to Claim 1, wherein the stationary phase media includes at least one particle, wherein the at least one particle has a surface area that is in a range from about 100 square meters/gram (3,407 square yards/ounce) to about 1,000 square meters/gram (33,488 square yard/ounce).

12. The method according to Claim 1, wherein after loading the stationary phase media and prior feeding a crude narcotic alkaloid solution into the chromatographic column, further includes removing fluid from the stationary phase media.

13. The method according to Claim 1, wherein after loading the stationary phase media and prior to feeding a crude narcotic alkaloid solution into the chromatographic column, further includes:

compressing the stationary phase media to create a packed bed; and
flushing the packed bed of stationary phase media with an acidic solution.

14. The method according to Claim 13, wherein the acidic solution is selected from the group consisting of acetic acid, formic acid, oxalic acid, succinic acid, lactic acid and tartaric acid.
15. The method according to Claim 1, wherein the crude narcotic alkaloid solution includes crude narcotic alkaloids dissolved in an acidic solution.
16. The method according to Claim 15, wherein the acidic solution is selected from the group consisting of acetic acid, formic acid, oxalic acid, succinic acid, lactic acid and tartaric acid.
17. The method according to Claim 1, further includes filtering the crude narcotic alkaloid solution.
18. The method according to Claim 1, further includes adding a reagent to the crude narcotic alkaloid solution.
19. The method according to Claim 18, wherein the reagent is selected from the group consisting of triethylamine, tetrabutylammonium hydrogen sulfate, sodium dodecyl sulfate, sodium heptane sulfonate and ammonium sulfate.
20. The method according to Claim 18, wherein the reagent is 0.5 volume percent to 5.0 volume percent of the crude narcotic alkaloid solution.
21. The method according to Claim 18, wherein the reagent is 2.0 volume percent to 2.5 volume percent of the crude narcotic alkaloid solution.
22. The method according to Claim 18, wherein the pH of the crude narcotic alkaloid solution is in a range from about 3.0 to about 3.5.

23. The method according to Claim 1, wherein a loading ratio of a mass of the stationary phase media to the crude narcotic alkaloid solution is in a range from about 1 to 1 to about 1 to 1,000.

24. The method according to Claim 1, wherein a loading ratio of a mass of the stationary phase media to the crude narcotic alkaloid solution is in a range from about 1 to 3 to about 1 to 40.

25. The method according to Claim 1, wherein a loading ratio of a mass of the stationary phase media to the crude narcotic alkaloid solution is in a range from about 1 to 10 to about 1 to 30.

26. The method according to Claim 1, wherein the loading of stationary phase media into the chromatographic column includes loading at least 0.255 kilograms (8.995 ounces) of the stationary phase media.

27. The method according to Claim 1, wherein the feeding a crude narcotic alkaloid solution into the chromatographic column includes feeding at least 0.255 grams (0.009 ounces) of the crude narcotic alkaloid solution.

28. The method according to Claim 1, wherein the feeding a crude narcotic alkaloid solution into the chromatographic column includes feeding at least 6.38 grams (0.225 ounces) of the crude narcotic alkaloid solution.

29. The method according to Claim 1, wherein the feeding a crude narcotic alkaloid solution into the chromatographic column includes feeding at least 8.50 grams (0.300 ounces) of the crude narcotic alkaloid solution.

30. The method according to Claim 1, wherein the recovering at least one narcotic alkaloid eluate from the chromatographic column includes recovering at least 0.255 grams (0.009 ounces) of the at least one narcotic alkaloid eluate.

31. The method according to Claim 1, wherein the recovering at least one narcotic alkaloid eluate from the chromatographic column includes recovering at least 6.38 grams (0.225 ounces) of the at least one narcotic alkaloid eluate.

32. The method according to Claim 1, wherein the recovering at least one narcotic alkaloid eluate from the chromatographic column includes recovering at least 8.50 grams (0.300 ounces) of the at least one narcotic alkaloid eluate.

33. The method according to Claim 1, wherein the recovering at least one narcotic alkaloid eluate from the chromatographic column includes recovering at least one (1) liter (0.264 gallons) of the at least one narcotic alkaloid eluate.

34. A method for separating at least one narcotic alkaloid comprising:
loading at least 0.255 kilograms (8.995 ounces) of the stationary phase media into a chromatographic column;
feeding at least 0.255 grams (0.009 ounces) crude narcotic alkaloid solution into the chromatographic column;
applying at least one mobile phase to the chromatographic column; and
recovering at least 0.255 grams (0.009 ounces) of at least one narcotic alkaloid eluate from the chromatographic column.

35. A method for separating at least one narcotic alkaloid comprising:
loading at least 0.255 kilograms (8.995 ounces) of the stationary phase media into a chromatographic column;

feeding at least 6.38 grams (0.225 ounces) crude narcotic alkaloid solution into the chromatographic column;

applying at least one mobile phase to the chromatographic column; and

recovering at least 6.38 grams (0.225 ounces) of at least one narcotic alkaloid eluate from the chromatographic column.

36. A method for separating at least one narcotic alkaloid comprising:

loading at least 0.255 kilograms (8.995 ounces) of the stationary phase media into a chromatographic column;

feeding at least 8.50 grams (0.300 ounces) crude narcotic alkaloid solution into the chromatographic column;

applying at least one mobile phase to the chromatographic column; and

recovering at least 8.50 grams (0.300 ounces) of at least one narcotic alkaloid eluate from the chromatographic column.

37. A method for separating at least one narcotic alkaloid comprising:

loading at least 0.255 kilograms (8.995 ounces) of the stationary phase media into a chromatographic column;

feeding at least 0.255 grams (0.009 ounces) crude narcotic alkaloid solution into the chromatographic column;

applying at least one mobile phase to the chromatographic column; and

recovering at least one (1.0) liter (0.264 gallons) of at least one narcotic alkaloid eluate from the chromatographic column.

38. The method according to Claim 1, wherein the at least one mobile phase includes an acidic solution and the narcotic alkaloid eluate includes morphine.

39. The method according to Claim 38, wherein the acidic solution is selected from the group consisting of acetic acid, formic acid, oxalic acid, succinic acid, lactic acid and tartaric acid.

40. The method according to Claim 38, wherein the acidic solution has a pH that is in a range from about 2 to about 5.

41. The method according to Claim 38, further includes:
adding a caustic solution to the morphine eluate to precipitate morphine; and
separating the precipitated morphine from the caustic solution.

42. The method according to Claim 41, wherein the caustic solution is selected from the group consisting of sodium hydroxide, potassium hydroxide, ammonium hydroxide and carbonate salts of alkali metals.

43. The method according to Claim 41, wherein the caustic solution is added to the morphine eluate to adjust the pH in a range from about 8 to about 10.

44. The method according to Claim 1, wherein the at least one mobile phase includes an acidic solution and the narcotic alkaloid eluate includes codeine.

45. The method according to Claim 44, wherein the acidic solution is selected from the group consisting of acetic acid, formic acid, oxalic acid, succinic acid, lactic acid and tartaric acid.

46. The method according to Claim 44, wherein the acidic solution has a pH that is in a range from about 2 to about 5.

47. The method according to Claim 44, further includes:

evaporating the codeine eluate to concentrate the codeine eluate;

at least one extraction of the concentrated codeine eluate with an organic solvent;

at least one back-extraction with an acidic solution;

adding a caustic solution to the concentrated codeine eluate to precipitate codeine;

and

separating the precipitated codeine from the caustic solution.

48. The method according to Claim 47, wherein the concentration of codeine in the codeine eluate is in a range from about 2 grams/liter (0.267 ounces/gallon) to about 30 grams/liter (4.0 ounces/gallon).

49. The method according to Claim 47, wherein the concentration of codeine in the codeine eluate is in a range from about 15 grams/liter (2.0 ounces/gallon) to about 25 grams/liter (3.34 ounces/gallon).

50. The method according to Claim 47, wherein the at least one extraction of the concentrated codeine eluate with an organic solvent is at a pH of at least 10.

51. The method according to Claim 47, wherein the at least one extraction of the concentrated codeine eluate with an organic solvent is at a pH of at least 11.5.

52. The method according to Claim 47, wherein the organic solvent is selected from the group consisting of toluene, ethyl acetate, chloroform, isobutanol and hexane.

53. The method according to Claim 47, wherein the at least one extraction of the concentrated codeine eluate with an organic solvent includes a ratio of organic solvent to aqueous solution in a range from about 0.5 to about 3.0.

54. The method according to Claim 47, wherein the at least one extraction of the concentrated codeine eluate with an organic solvent includes a ratio of organic solvent to aqueous solution in a range from about 0.8 to about 1.2.

55. The method according to Claim 47, wherein the at least one extraction of the concentrated thebaine eluate with an organic solvent includes adding a base.

56. The method according to Claim 55, wherein the base is selected from the group consisting of sodium hydroxide, ammonium hydroxide and potassium hydroxide.

57. The method according to Claim 47, wherein the base includes sodium hydroxide that can range from about 50 milligrams/milliliter (6.68 ounces/gallon) to about 750 milligrams/milliliter (100.0 ounces/gallon).

58. The method according to Claim 47, wherein the base includes sodium hydroxide that can range from about 150 milligrams/milliliter (20.0 ounces/gallon) to about 350 milligrams/milliliter (46.7 ounces/gallon).

59. The method according to Claim 47, wherein the at least one extraction of the concentrated codeine eluate with an organic solvent includes stirring for a predetermined period of time and followed by allowing the solution to settle for a predetermined period of time.

60. The method according to Claim 59, wherein the predetermined period of time for stirring is at least one (1) minute during the at least one extraction of the concentrated codeine eluate with an organic solvent and the predetermined period of time for settling is at least one (1) minute.

61. The method according to Claim 47, wherein the at least one back-extraction with an acidic solution includes a ratio of organic solvent to aqueous solution in a range from about 1.0 to about 3.0.

62. The method according to Claim 47, wherein the at least one back-extraction with an acidic solution includes a ratio of organic solvent to aqueous solution in a range from about 1.6 to about 2.4.

63. The method according to Claim 47, wherein the at least one back-extraction with an acidic solution includes a pH that is under 5.0.

64. The method according to Claim 47, wherein the at least one back-extraction with an acidic solution includes a pH that is under 3.5.

65. The method according to Claim 47, wherein the acidic solution includes acid selected from the group consisting of acetic acid, formic acid, hydrochloric acid and phosphoric acid.

66. The method according to Claim 47, wherein the at least one back-extraction with an acidic solution includes stirring for a predetermined period of time and followed by allowing the solution to settle for a predetermined period of time.

67. The method according to Claim 66, wherein the predetermined period of time for stirring is at least one (1) minute during the at least one extraction of the concentrated codeine eluate with an organic solvent and the predetermined period of time for settling is at least one (1) minute.

68. A method for separating at least one narcotic alkaloid comprising:
loading stationary phase media into a chromatographic column;
feeding a crude narcotic alkaloid solution into the chromatographic column;
applying at least one mobile phase to the chromatographic column;
recovering morphine and codeine from the chromatographic column;
converting the morphine into a synthesized codeine;
feeding a synthesized codeine into the chromatographic column; and
recovering the synthesized codeine from the chromatographic column.
69. The method according to Claim 68, further includes:
adding a caustic solution to the codeine and the synthesized codeine to precipitate codeine; and
separating the precipitated codeine from the caustic solution.
70. The method according to Claim 69, wherein the caustic solution is selected from the group consisting of sodium hydroxide, potassium hydroxide, ammonium hydroxide and carbonate salts of alkali metals.
71. The method according to Claim 1, wherein the at least one mobile phase includes an acidic solution and the narcotic alkaloid eluate includes oripavine.
72. The method according to Claim 71, wherein the acidic solution is selected from the group consisting of acetic acid, formic acid, oxalic acid, succinic acid, lactic acid and tartaric acid.
73. The method according to Claim 71, wherein the acidic solution has a pH that is in a range from about 2 to about 5.

74. The method according to Claim 71, further includes:

adding a caustic solution to the oripavine eluate to precipitate oripavine; and
separating the oripavine from the caustic solution.

75. The method according to Claim 74, wherein the caustic solution is added to the oripavine eluate to adjust the pH in a range from about 8 to about 10.

76. The method according to Claim 74, wherein the caustic solution is selected from the group consisting of sodium hydroxide, potassium hydroxide, ammonium hydroxide and carbonate salts of alkali metals.

77. The method according to Claim 1, wherein the at least one mobile phase includes a solvent and the narcotic alkaloid eluate includes thebaine.

78. The method according to Claim 77, wherein the solvent is selected from the group consisting of acetonitrile, methanol and isopropanol.

79. The method according to Claim 77, wherein the solvent has a pH that is in a range from about 2 to about 5.

80. The method according to Claim 77, further includes:

evaporating the thebaine eluate, that also includes an acetate solution, to concentrate the thebaine eluate;

adding a caustic solution to the concentrated thebaine eluate to precipitate thebaine; and

separating the precipitated thebaine from the caustic solution.

81. The method according to Claim 80, wherein the caustic solution is added to the thebaine eluate to adjust the pH so that the pH is over 9.

82. The method according to Claim 81, wherein the caustic solution is selected from the group consisting of sodium hydroxide, potassium hydroxide, ammonium hydroxide and carbonate salts of alkali metals.

83. The method according to Claim 77, further includes:
evaporating the thebaine eluate to concentrate the thebaine eluate;
at least one extraction of the concentrated thebaine eluate with an organic solvent;
at least one back-extraction with an acidic solution;
adding a caustic solution to the concentrated thebaine eluate to precipitate thebaine; and
separating the precipitated thebaine from the caustic solution.

84. The method according to Claim 83, wherein the concentration of thebaine in the thebaine eluate is in a range from about 1 grams/liter (0.134 ounces/gallon) to about 8 grams/liter (1.07 ounces/gallon).

85. The method according to Claim 83, wherein the concentration of thebaine in the thebaine eluate is in a range from about 3 grams/liter (0.40 ounces/gallon) to about 4 grams/liter (0.534 ounces/gallon).

86. The method according to Claim 83, wherein the at least one extraction of the concentrated thebaine eluate with an organic solvent is at a pH in a range from about 5 to about 11.

87. The method according to Claim 83, wherein the at least one extraction of the concentrated thebaine eluate with an organic solvent is at a pH in a range from about 6 to about 7.

88. The method according to Claim 83, wherein the organic solvent is selected from the group consisting of toluene, ethyl acetate, chloroform, isobutanol and hexane.

89. The method according to Claim 83, wherein the at least one extraction of the concentrated thebaine eluate with an organic solvent includes a ratio of organic solvent to aqueous solution in a range from about 0.5 to about 3.0.

90. The method according to Claim 83, wherein the at least one extraction of the concentrated thebaine eluate with an organic solvent includes a ratio of organic solvent to aqueous solution in a range from about 0.9 to about 1.2.

91. The method according to Claim 83, wherein the at least one extraction of the concentrated thebaine eluate with an organic solvent includes adding a base.

92. The method according to Claim 83, wherein the base is selected from the group consisting of sodium hydroxide, ammonium hydroxide and potassium hydroxide.

93. The method according to Claim 83, wherein the base includes sodium hydroxide that can range from about 50 milligrams/milliliter (6.68 ounces/gallon) to about 750 milligrams/milliliter (100.0 ounces/gallon).

94. The method according to Claim 83, wherein the base includes sodium hydroxide that can range from about 150 milligrams/milliliter (20.0 ounces/gallon) to about 350 milligrams/milliliter (46.7 ounces/gallon).

95. The method according to Claim 83, wherein the at least one extraction of the concentrated thebaine eluate with an organic solvent includes stirring for a predetermined period of time followed by allowing the solution to settle for a predetermined period of time.

96. The method according to Claim 95, wherein the predetermined period of time for stirring is at least one (1) minute during the at least one extraction of the concentrated thebaine eluate with an organic solvent and the predetermined period of time for settling is at least ten (10) minutes.

97. The method according to Claim 83, wherein the at least one back-extraction with an acidic solution includes a ratio of organic solvent to aqueous solution in a range from about 1.0 to about 5.0.

98. The method according to Claim 83, wherein the at least one back-extraction with an acidic solution includes a ratio of organic solvent to aqueous solution in a range from about 2.0 to about 3.0.

99. The method according to Claim 83, wherein the at least one back-extraction with an acidic solution includes a range of pH from about 2.5 to about 4.0.

100. The method according to Claim 83, wherein the at least one back-extraction with an acidic solution includes a range of pH from about 3.0 to about 3.5.

101. The method according to Claim 83, wherein the acidic solution includes acid selected from the group consisting of acetic acid, formic acid and oxalic acid.

102. The method according to Claim 83, wherein the at least one back-extraction with an acidic solution includes stirring for a predetermined time period followed by settling for a predetermined time period.

103. The method according to Claim 102, wherein the predetermined time period for stirring is at least one (1) minute and the predetermined time period for settling is at least one minute.

104. The method according to Claim 83, wherein the adding a caustic solution to the concentrated thebaine eluate to precipitate thebaine includes a concentration of thebaine eluate in a range from about 1 gram/liter (0.13 ounces/gallon) to about 20 grams/liter (2.67 ounces/gallon).

105. The method according to Claim 83, wherein the adding a caustic solution to the concentrated thebaine eluate to precipitate thebaine includes a concentration of thebaine eluate in a range from about 2 grams/liter (0.27 ounces/gallon) to about 6 grams/liter (0.80 ounces/gallon).

106. The method according to Claim 83, wherein the adding a caustic solution to the concentrated thebaine eluate to precipitate thebaine further includes adding an organic solvent.

107. The method according to Claim 106, wherein the organic solvent is selected from the group consisting of ethanol, isopropanol and methanol.

108. The method according to Claim 106, wherein the organic solvent has a concentration in a range from about 5 volume percent to about 20 volume percent.

109. The method according to Claim 106, wherein the organic solvent has a concentration in a range from about 8 volume percent to about 12 volume percent.

110. The method according to Claim 83, wherein the caustic solution is selected from the group consisting of sodium hydroxide, potassium hydroxide, ammonium hydroxide and carbonate salts of alkali metals.

111. The method according to Claim 83, wherein the caustic solution is added to the thebaine eluate to adjust the pH so that the pH is at least 10.

112. The method according to Claim 83, wherein the caustic solution is added to the thebaine eluate to adjust the pH so that the pH is at least 10 at a temperature in a range from about 20 degrees Celsius (68 degrees Fahrenheit) to about 80 degrees Celsius (176 degrees Fahrenheit).

113. The method according to Claim 83, wherein the caustic solution is added to the thebaine eluate to adjust the pH so that the pH is at least 10 at a temperature in a range from about 50 degrees Celsius (122 degrees Fahrenheit) to about 60 degrees Celsius (140 degrees Fahrenheit).

114. The method according to Claim 83, wherein the caustic solution has a concentration in a range from about 100 grams/liter (13.35 ounces/gallon) to about 500 grams/liter (66.76 ounces/gallon).

115. The method according to Claim 83, wherein the caustic solution has a concentration in a range from about 200 grams/liter (13.35 ounces/gallon) to about 300 grams/liter (40.06 ounces/gallon).

116. The method according to Claim 83, wherein the separating the precipitated thebaine from the caustic solution is at a final temperature of less than 25 degrees Celsius (77 degrees Fahrenheit).

117. The method according to Claim 1, wherein the at least one mobile phase includes a solvent and the narcotic alkaloid eluate includes narcotine.

118. The method according to Claim 117, wherein the solvent is selected from the group consisting of acetonitrile, methanol and isopropanol.

119. The method according to Claim 117, wherein the solvent has a pH that is in a range from about 2 to about 5.

120. The method according to Claim 117, further includes:
evaporating the narcotine eluate, that also includes acetate, to concentrate the narcotine eluate;
adding a caustic solution to the concentrated narcotine eluate to precipitate narcotine; and
separating the precipitated narcotine from the caustic solution.

121. The method according to Claim 120, wherein the caustic solution is added to the narcotine eluate to adjust the pH in a range from about 3.5 to about 5.5.

122. The method according to Claim 120, wherein the caustic solution is selected from the group consisting of sodium hydroxide, potassium hydroxide, ammonium hydroxide and carbonate salts of alkali metals.

123. The method according to Claim 117, further includes:
evaporating the narcotine eluate, that also includes acetate, to concentrate the narcotine eluate;
at least one extraction of the concentrated narcotine eluate with an organic solvent;
adding a caustic solution to the concentrated narcotine eluate to precipitate narcotine; and
separating the precipitated narcotine from the caustic solution.

124. The method according to Claim 123, wherein the concentration of narcotine in the narcotine eluate is in a range from about 2 grams/liter (0.27 ounces/gallon) to about 8 grams/liter (1.07 ounces/gallon).

125. The method according to Claim 123, wherein the concentration of narcotine in the narcotine eluate is in a range from about with more preferred concentration range of narcotine from about 6 grams/liter (0.80 ounces/gallon) to about 7 grams/liter (0.94 ounces/gallon).

126. The method according to Claim 123, wherein the at least one extraction of the concentrated narcotine eluate with an acidic solution is at a pH in a range from about 3.0 to about 5.0.

127. The method according to Claim 123, wherein the at least one extraction of the concentrated narcotine eluate with an acidic solution is at a pH in a range from about 3.9 to about 4.1.

128. The method according to Claim 123, wherein the organic solvent is selected from the group consisting of toluene, ethyl acetate, chloroform, isobutanol and hexane.

129. The method according to Claim 123, wherein the at least one extraction of the concentrated narcotine eluate with an organic solvent includes a ratio of organic solvent to aqueous solution in a range from about 0.5 to about 3.0.

130. The method according to Claim 123, wherein the at least one extraction of the concentrated narcotine eluate with an organic solvent includes a ratio of organic solvent to aqueous solution in a range from about 0.9 to about 1.2.

131. The method according to Claim 123, wherein the at least one extraction of the concentrated narcotine eluate with an organic solvent includes adding a base.

132. The method according to Claim 131, wherein the base is selected from the group consisting of sodium hydroxide, ammonium hydroxide and potassium hydroxide.

133. The method according to Claim 131, wherein the base includes sodium hydroxide that can range from about 50 milligrams/milliliter (6.68 ounces/gallon) to about 750 milligrams/milliliter (100.0 ounces/gallon).

134. The method according to Claim 131, wherein the base includes sodium hydroxide that can range from about 150 milligrams/milliliter (20.0 ounces/gallon) to about 350 milligrams/milliliter (46.7 ounces/gallon).

135. The method according to Claim 123, wherein the at least one extraction of the concentrated narcotine eluate with an organic solvent includes stirring for a predetermined period of time and allowing settling for a predetermined period of time.

136. The method according to Claim 135, wherein the predetermined period of time for stirring is at least one (1) minute during the at least one extraction of the concentrated narcotine eluate with an organic solvent and the predetermined period of time for settling is at least ten (10) minutes during the at least one extraction of the concentrated narcotine eluate.

137. The method according to Claim 123, wherein the adding a caustic solution to the concentrated narcotine eluate to precipitate narcotine includes a concentration of narcotine eluate in a range from about 2 grams/liter (0.27 ounces/gallon) to about 10 grams/liter (1.34 ounces/gallon).

138. The method according to Claim 123, wherein the adding a caustic solution to the concentrated narcotine eluate to precipitate narcotine includes a concentration of narcotine eluate in a range from about 4 grams/liter (0.53 ounces/gallon) to about 8 grams/liter (1.07 ounces/gallon).

139. The method according to Claim 123, wherein prior to the adding a caustic solution to the concentrated narcotine eluate to precipitate narcotine includes adding an acidic solution.

140. The method according to Claim 123, wherein the acidic solution includes acid selected from the group consisting of acetic acid, hydrochloric acid, organic acid and mineral acid.

141. The method according to Claim 123, upon adding the acidic solution there is a range of pH that is from about 1.0 to about 3.5.

142. The method according to Claim 123, upon adding the acidic solution there is a range of pH that is from about 2.5 to about 3.2.

143. The method according to Claim 123, wherein the caustic solution is selected from the group consisting of sodium hydroxide, potassium hydroxide, ammonium hydroxide and carbonate salts of alkali metals.

144. The method according to Claim 123, wherein the caustic solution is added to the narcotine eluate to adjust the pH so that the pH is in a range from about 4.0 to about 12.0.

145. The method according to Claim 123, wherein the caustic solution is added to the narcotine eluate to adjust the pH so that the pH is in a range from about 4.9 to about 5.2.

146. The method according to Claim 123, wherein the caustic solution has a concentration in a range from about 100 grams/liter (13.35 ounces/gallon) to about 500 grams/liter (66.76 ounces/gallon).

147. The method according to Claim 123, wherein the caustic solution has a concentration in a range from about 200 grams/liter (13.35 ounces/gallon) to about 300 grams/liter (40.06 ounces/gallon).

148. The method according to Claim 123, wherein the separating the precipitated thebaine from the caustic solution is at a final temperature of less than 25 degrees Celsius (77 degrees Fahrenheit).

149. The method according to Claim 1, wherein the at least one mobile phase includes a solvent and the narcotic alkaloid eluate includes papaverine.

150. The method according to Claim 150, wherein the solvent is selected from the group consisting of acetonitrile, methanol and isopropanol.

151. The method according to Claim 1, further includes reusing the stationary phase media after all recovering all of the narcotic eluates by driving the impurities back out of a top portion of the preparative chromatography column by applying another mobile phase to the preparative chromatography column.

152. A method for separating at least one narcotic alkaloid comprising:
feeding a crude narcotic alkaloid solution into a chromatographic column that includes stationary phase media;
applying an acidic solution to the chromatographic column;
recovering a morphine eluate, a codeine eluate and then an oripavine eluate from the chromatographic column;
applying at least one organic solvent to the chromatographic column; and
recovering a thebaine eluate and then a narcotine eluate from the chromatographic column.

153. A method for separating at least one narcotic alkaloid comprising:
feeding a crude narcotic alkaloid solution into a chromatographic column that includes stationary phase media;
applying an acidic solution to the chromatographic column, the acidic solution has a pH that is in a range from about 2 to about 5;
recovering a morphine eluate from the chromatographic column;
recovering a codeine eluate from the chromatographic column;
recovering an oripavine eluate from the chromatographic column;
applying a first organic solvent to the chromatographic column, wherein the first organic solvent has a pH that is in a range from about 2 to about 5;
recovering a thebaine eluate narcotine eluate from the chromatographic column;
applying a second organic solvent to the chromatographic column, wherein the second organic solvent has a pH that is in a range from about 2 to about 5; and
recovering a narcotine eluate from the chromatographic column.

154. A method for separating at least one narcotic alkaloid comprising:
feeding a crude narcotic alkaloid solution into a chromatographic column that includes compressed stationary phase media;
applying an acidic solution to the chromatographic column, wherein the acidic solution has a pH that is in a range from about 2 to about 5;
recovering a morphine eluate from the chromatographic column;
adding a caustic solution to the morphine eluate to precipitate;
separating the precipitated morphine from the caustic solution;
recovering a codeine eluate from the chromatographic column;
evaporating the codeine eluate to concentrate the codeine eluate;
adding a caustic solution to the concentrated codeine eluate to precipitate codeine;
separating the precipitated codeine from the caustic solution;
recovering an oripavine eluate from the chromatographic column;
adding a caustic solution to the oripavine eluate to precipitate oripavine;

separating the precipitated oripavine from the caustic solution;
applying a first organic solvent to the chromatographic column;
recovering a thebaine eluate narcotine eluate from the chromatographic column;
evaporating the thebaine eluate, that also includes an acetate solution, to
concentrate the thebaine eluate;
adding a caustic solution to the concentrated thebaine eluate to precipitate
thebaine;
separating the precipitated thebaine from the caustic solution;
applying a second organic solvent to the chromatographic column;
recovering a narcotine eluate from the chromatographic column;
evaporating the narcotine eluate, that also includes acetate, to concentrate the
narcotine eluate;
adding a caustic solution to the concentrated narcotine eluate to precipitate
narcotine; and
separating the precipitated narcotine from the caustic solution.

155. A system for separating at least one narcotic alkaloid comprising:
a chromatographic column having a fluid chamber and a media chamber, with a
diameter that is at least 5 centimeters (1.97 inches), and having an inlet and an outlet;
a piston that includes a plate, having an upper face and a lower face, and a rod,
having a first end portion and a second end portion, wherein the second end portion of the
rod is attached to the upper face of the plate and the piston is located within the
chromatographic column; and
a hydraulic fluid pressure applying mechanism that provides fluid to the fluid
chamber for moving the piston downward and compressing stationary phase media
between the lower face of the plate and the bottom of the chromatographic column,
wherein a crude narcotic alkaloid solution is then received from the inlet followed by at
least one mobile phase that is also received by the inlet of the chromatographic column,

wherein at least one narcotic alkaloid is then eluted from the outlet of the chromatographic column.

156. The system according to Claim 155, wherein the hydraulic fluid pressure applying mechanism includes a piston connected in a fluid relationship to a pump, wherein the pump is connected in fluid relationship to a hydraulic reservoir.

157. A system for separating at least one narcotic alkaloid comprising:
a chromatographic column having a fluid chamber and a media chamber, with a diameter that is at least 5 centimeters (1.97 inches), and having an inlet and an outlet;
a piston that includes a plate, having an upper face and a lower face, and a rod, having a first end portion and a second end portion, wherein the second end portion of the rod is attached to the upper face of the plate and the piston is located within the chromatographic column; and
a hydraulic fluid pressure applying mechanism that provides fluid to the fluid chamber for moving the piston downward and compressing stationary phase media between the lower face of the plate and the bottom of the chromatographic column, wherein a crude narcotic alkaloid solution is then received from the inlet followed by at least one mobile phase that is also received by the inlet of the chromatographic column, wherein at least one narcotic alkaloid is then eluted from the outlet of the chromatographic column.

158. A system for separating at least one narcotic alkaloid comprising:
a chromatographic column having a fluid chamber and a media chamber, with a diameter that is at least 5 centimeters (1.97 inches), and having an inlet and an outlet;
a piston that includes a plate, having an upper face and a lower face, and a rod, having a first end portion and a second end portion, wherein the second end portion of the rod is attached to the upper face of the plate and the piston is located within the chromatographic column; and

a hydraulic fluid pressure applying mechanism that provides fluid to the fluid chamber for moving the piston downward and compressing at least 0.255 kilograms (8.995 ounces) of stationary phase media between the lower face of the plate and the bottom of the chromatographic column, wherein at least 0.255 grams (0.009 ounces) of crude narcotic alkaloid solution is then received from the inlet followed by at least one mobile phase that is also received by the inlet of the chromatographic column, wherein at least 0.255 grams (0.009 ounces) of at least one narcotic alkaloid is then eluted from the outlet of the chromatographic column.

159. A system for separating at least one narcotic alkaloid comprising:

a chromatographic column having a fluid chamber and a media chamber, with a diameter that is at least 5 centimeters (1.97 inches), and having an inlet and an outlet;

a piston that includes a plate, having an upper face and a lower face, and a rod, having a first end portion and a second end portion, wherein the second end portion of the rod is attached to the upper face of the plate and the piston is located within the chromatographic column; and

a hydraulic fluid pressure applying mechanism that provides fluid to the fluid chamber for moving the piston downward and compressing stationary phase media between the lower face of the plate and the bottom of the chromatographic column, wherein at least 0.255 grams (0.009 ounces) of crude narcotic alkaloid solution is then received from the inlet followed by at least one mobile phase that is also received by the inlet of the chromatographic column, wherein at least one liter (0.264 gallons) of at least one narcotic alkaloid is then eluted from the outlet of the chromatographic column.

160. A system for separating at least one narcotic alkaloid comprising:

a chromatographic column having a fluid chamber and a media chamber, with a diameter that is at least 5 centimeters (1.97 inches), and having an inlet and an outlet;

a piston that includes a plate, having an upper face and a lower face, and a rod, having a first end portion and a second end portion, wherein the second end portion of the

rod is attached to the upper face of the plate and the piston is located within the chromatographic column;

a hydraulic fluid pressure applying mechanism that provides fluid to the fluid chamber for moving the piston downward and compressing stationary phase media between the lower face of the plate and the bottom of the chromatographic column; and

at least one valve mechanism that provides a flow of the stationary phase media into the inlet of chromatographic column and then removes fluid during the compression of the stationary phase media, wherein the valve mechanism, after compression of the stationary phase media, then provides a flow of a crude narcotic alkaloid solution into the inlet of the chromatographic column followed by a flow of at least one mobile phase, wherein the at least one valve mechanism then allows at least one narcotic alkaloid to elute from the outlet of the chromatographic column.

161. The system according to Claim 160, wherein the at least one valve mechanism includes at least one valve that selectively allows passage of fluid.

162. The system according to Claim 160, further includes a detection device that determines a specific type of narcotic alkaloid that is being eluted from the outlet of the chromatographic column.

163. A system for separating at least one narcotic alkaloid comprising:

a chromatographic column having a fluid chamber and a media chamber, with a diameter that is at least 5 centimeters (1.97 inches) and having an inlet connected in fluid relationship to a first valve that is connected in fluid relationship to a liquid tank, an outlet connected in fluid relationship to a second valve, which is connected in fluid relationship to an eluate tank, and a fluid purge orifice connected in fluid relationship to a third valve, wherein the third valve is connected in fluid relationship to the outlet;

a double-acting piston that includes a plate, having an upper face and a lower face, and a rod, having a first end portion and a second end portion, wherein the second end

portion of the rod is attached to the upper face of the plate and the piston is located within the chromatographic column and is for compressing a stationary phase media between the lower face of the plate and the bottom of the chromatographic column; and

a hydraulic pump that provides fluid to the double-acting piston to depress the double-acting piston downward and compressing the stationary phase media, wherein fluid is released through the purge orifice from the outlet of the chromatographic column through the third valve after the compression of the stationary phase media, thereafter a crude alkaloid solution can be delivered from the liquid tank to the inlet of the chromatographic column followed by at least one mobile phase when the first valve is open with at least one narcotic alkaloid recovered from the outlet of the chromatographic column in the eluate tank when the second valve is open.